

## AMPHIBIA: ANURA: LEPTODACTYLIDAE

## LEPTODACTYLUS FURNARIUS

## Catalogue of American Amphibians and Reptiles.

Heyer, W. R., and M. M. Heyer. 2004. *Leptodactylus furnarius*.

***Leptodactylus furnarius* Sazima and Bokermann**  
Cerrado Oven Frog

*Leptodactylus furnarius* Sazima and Bokermann 1978:899. Type locality, "Campo Grande, (900M) Paranapiacaba, São Paulo, Brasil." Holotype, Museu de Zoologia da Universidade de São Paulo (MZUSP) 73678 (formerly WCAB 47949), adult male, collected by W.C.A. Bokermann and I. Sazima on 20 December 1973 (examined by WRH).

*Leptodactylus laurae* Heyer 1978:59.

• **CONTENT.** The species is monotypic.

• **DEFINITION.** Adult *Leptodactylus furnarius* males are of small to moderate size, females are small, the head is longer than wide, and the hind limbs are long (see **Table**; Heyer and Thompson 2000 provided definitions of adult size and leg length categories for *Leptodactylus*). Male vocal sacs are either median and moderately expanded or moderately expanded laterally and either lightly pigmented or unpigmented. Neither males nor females have spatulate snouts. Male forearms are not hypertrophied. Males lack asperities on the thumbs and chest. Six well-defined dorsolateral folds are present. Toe tips are narrow. Toes lack fringes and may or may not have a very weak lateral ridge basally and vestigial web between toes I–II–III–IV. The upper shank is smooth (tubercles lacking). The outer tarsus is smooth. The sole of the foot is smooth.

The upper lip usually (71%) has a distinct light stripe, sometimes (29%) the stripe is indistinct. The dorsum is spotted or striped. A light middorsal stripe is always present. The belly is usually immaculate or sometimes with a few melanophores or small spots encroaching laterally onto the belly. The posterior thigh surfaces have distinct (51%) to indistinct (49%) light horizontal stripes on their lower aspects. The upper shanks have dark crossbands, usually interrupted medially; no longitudinal light pin-stripes are present.

Larvae (description based on Sazima and Bokermann 1978) have a typical pond morphology and are members of the lentic, benthic guild (McDiarmid and Altig 1999, guild 7). The oral disk is anteroventrally positioned, entire (not emarginate), with an anterior gap lacking marginal papillae. The tooth row formula is 2(2)/3(1). The spiracle is sinistral and the vent tube is median. The dorsal fin ends at the body and does not extend onto it. At Gosner stage 38, the larval TL = 41 mm. The dorsum and sides of the body are blackish-gray, darker dorsally. The venter is iridescent white in life, patternless in preservative. The tail is speckled with dark gray or black markings, the speckles are irregular and usually confluent. The iris is yellow in life.

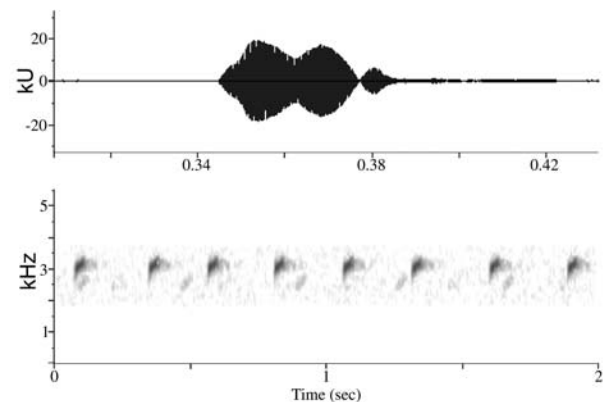
The advertisement call consists of a single note per call, given at a rate of about 200/min (recording analyzed for this description) to about 450/min (Sazima and Bokermann 1978). Calls are given in bouts lasting 30 s or more (Sazima and Bokermann 1978). Call duration is 0.04 s (Sazima and Bokermann's 1978 value of 0.10 s apparently included a terminal portion of the call in their Fig. 3 that is probably due to over-recording or microphone ringing). The call is moderately amplitude modulated with 3–4 partial pulses; the end of the call often has a complete pulse. The call is frequency modulated, starting at 2600–2800 Hz and rising to 3300–3400 Hz. The call reaches maximum intensity at about 15% of the call duration. The dominant frequency is the fundamental frequency and is about 3000 Hz (3014



**FIGURE 1.** *Leptodactylus furnarius*, an unvouchered specimen from Serra do Cipó, Minas Gerais, Brazil (photograph courtesy of Paula C. Eterovick).



**FIGURE 2.** Tadpole of *Leptodactylus furnarius* (WCAB 48127 – this specimen was not with the Bokermann collection materials catalogued into the MZUSP collection [C. Mello, pers. comm.], nor could it be found in the ZUEC collection [I. Sazima, pers. comm.]) from Campo Grande, São Paulo, Brazil (image published with permission of the Revista Brasileira de Biologia).



**FIGURE 3.** Wave form and audiospectrogram displays of the advertisement call of *Leptodactylus furnarius* (USNM recording 226, cut 4) from Chapada dos Guimaraes, Aldeia Velha, Mato Grosso, Brazil. Wave form of the second call in the audiospectrogram.

Hz for the call analyzed herein). No indication of harmonic structure is evident in the call.

• **DIAGNOSIS.** The species that have a combination of light stripes on the posterior surface of the thigh (either distinct or at least discernible) and smooth surfaces on the posterior surface of the tarsus and sole of foot in some or all individuals are *Leptodactylus furnarius*, *L. fuscus*, *L. gracilis*, *L. longirostris*, *L. marambaiae*, *L. notoaktites*, *L. plaumanni*, and *L. poecilochilus*. *Leptodactylus furnarius* lacks light stripes on the dorsal surface of the shank; such stripes occur in *L. gracilis*, *L. marambaiae*,

and *L. plaumanni*. All individuals of *L. furnarius* have a light middorsal stripe and at least six dorsolateral folds; only some individuals of *L. fuscus*, *L. longirostris*, *L. notoaktites*, and *L. poecilochilus* have the same combination. Most individuals of *L. fuscus* lack light middorsal stripes (but all have at least six dorsolateral folds), and other individuals of *L. longirostris*, *L. notoaktites*, and *L. poecilochilus* lack the pair of dorsolateral folds immediately on either side of the midline and also lack a light dorsal stripe. *Leptodactylus furnarius* is most difficult to distinguish from individuals of *L. fuscus*, *L. longirostris*, *L. notoaktites*, and *L. poecilochilus* that have at least six dorsolateral folds and a light middorsal stripe. The leg of *L. furnarius* is longer (e.g., foot length/SVL 57–72%) than in *L. fuscus*, *L. longirostris*, and *L. poecilochilus* (e.g., foot length/SVL 42–60%). The dominant frequency of the advertisement call of *L. furnarius* is frequency modulated between 2600–3400 Hz, whereas that of *L. notoaktites* ranges from 470–1990 Hz.

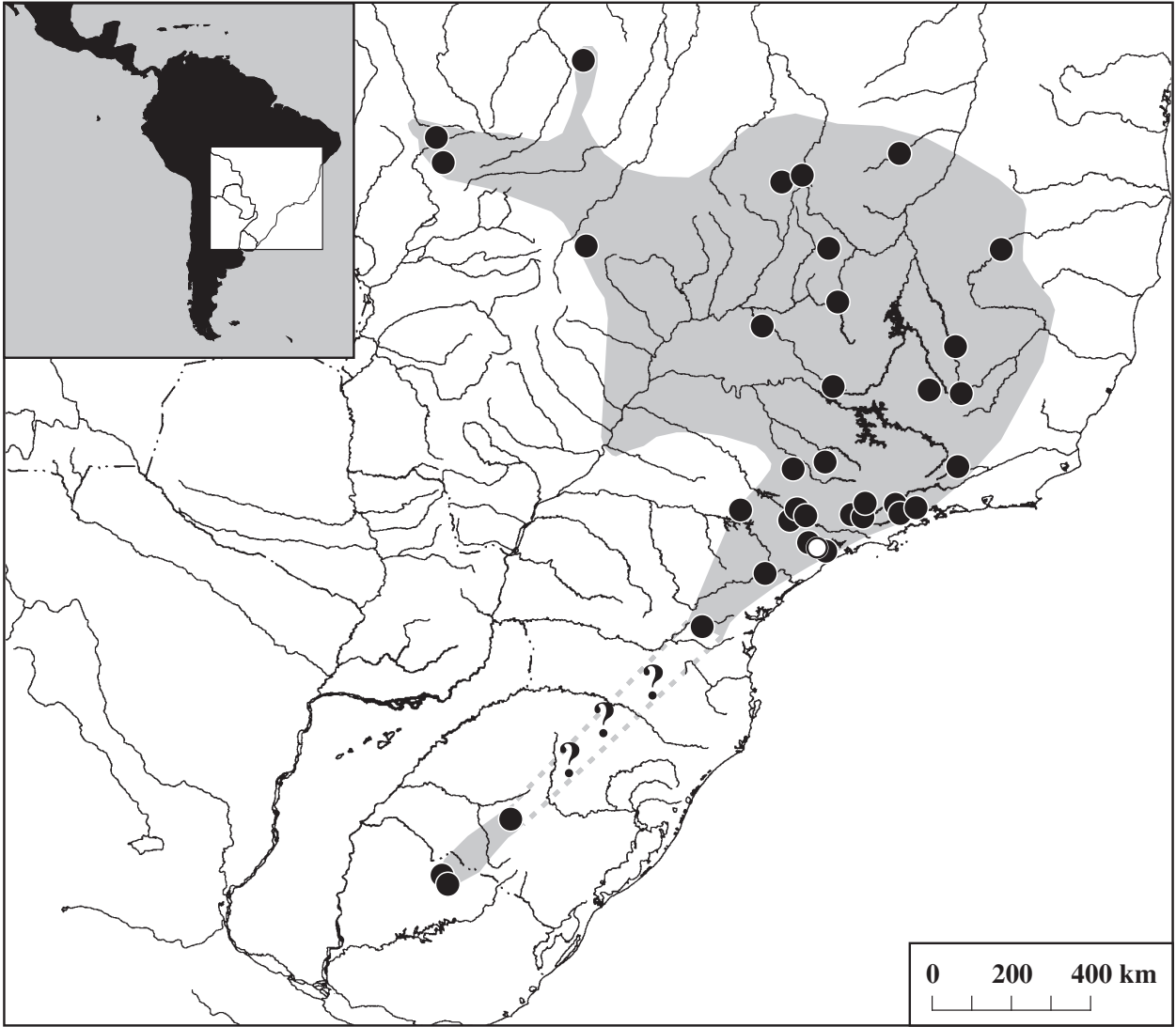
• **DESCRIPTIONS.** Sazima and Bokermann (1978) engendered a morphological description of the holotype including color. Cochran’s (1955, as *L. gracilis*) detailed description considered

color in alcohol, whereas Heyer’s (1978, as *L. laurae*) included life color. Heyer (1978, as *L. laurae*) discussed sexually dimorphic characteristics. An account of the larva with color is in Sazima and Bokermann (1978). Advertisement calls are outlined in García Pérez and Heyer (1993) and Sazima and Bokermann (1978). The karyotype is unknown.

• **ILLUSTRATIONS.** A color photograph appears in

**TABLE.** Summary measurement data for *Leptodactylus furnarius* (means are in parentheses).

Measurement	Males	Females
SVL (mm)	31–39 (36.5)	32–45 (40.7)
Head length/SVL (%)	35–41 (38)	35–41 (37)
Head width/SVL (%)	29–35 (32)	29–34 (31)
Thigh length/SVL (%)	41–54 (49)	45–52 (49)
Shank length/SVL (%)	53–66 (59)	54–67 (59)
Foot length/SVL (%)	57–72 (65)	58–70 (63)



**MAP.** Distribution of *Leptodactylus furnarius*: The circle marks the type locality, dots indicate other localities (a dot may represent more than one proximate site), and question marks denote the unknown status of predicted distribution. Published locality data used to generate the map should be considered as secondary sources of information, as we did not confirm all specimen identities. The locality coordinate data and sources are available on a spread sheet at <http://learning.richmond.edu/Leptodactylus>.

Bokermann and Sazima (1974, as *L. gracilis*). Black and white photographs are in Heyer (1978, as *L. laurae*), Jim (1980), and Sazima and Bokermann (1978). Sazima and Bokermann (1978) also provided a lateral view of the tadpole. Audiospectrograms of the advertisement call are in Giaretta and Kokubum (2003) and Sazima and Bokermann (1978), and a wave form of the call appears in Giaretta and Kokubum (2004). Giaretta and Kokubum (2004) pictured gypsum molds of the species' incubating chambers.

• **DISTRIBUTION.** The species occurs in central, southeastern, and southern Brazil, and just over the Brazilian border into Uruguay. *Leptodactylus furnarius* is characteristic of open formations and occurs throughout much of the Cerrado Morphoclimatic Domain (Ab'Sáber 1977), including the specialized campo rupestre habitat in the Serra do Espinhaço range. The species occurs within open areas of more mesic habitats, such as the Atlantic Forest Morphoclimatic Domain of Brazil (Ab'Sáber 1977). Duellman (1999) tabled its natural region distribution as Atlantic Forest Domain; Colli et al. (2002) and Strüßmann (2000) noted its occurrence in the Cerrado. Harding (1983) listed its distribution by countries. Heyer (1978, as *L. laurae*) contributed a distributional map of the species. Eterovick and Sazima (2000b) noted its occurrence at 1200 m, and Toledo (2003) recorded it at 725 m.

Other distributional references and localities are ordered by country; the letter (M) indicates a species mention: **Brazil** (Bernardes and Caramaschi 1993; Brandão and Araujo 1998, 2001; Brandão et al. 1998; Cochran 1955, as *L. gracilis*; Eterovick 2003; Eterovick and Sazima 2000a (M), 2000b; Eterovick and Fernandes 2001, 2002; Feio and Caramaschi 1995; García Pérez and Heyer 1993; Giaretta and Kokubum 2004; Haddad et al. 1988; Heyer 1978, as *L. laurae*; Jim 1980; Kisteumacher et al. 1984; Menin and Giaretta 2003; Moreira and Barreto 1996; Rossa-Feres and Jim 1994; Sazima and Bokermann 1978; Strüßmann 2000; Toledo 2003; Zerbini and Brandão 2001); **Uruguay** (Canavero et al. 2001).

• **FOSSIL RECORD.** None.

• **PERTINENT LITERATURE.** The most comprehensive articles on the species are those of Cochran (1955, as *L. gracilis*), Heyer (1978, as *L. laurae*), and Sazima and Bokermann (1978). The following literature is listed by topic and the symbol (M) indicates the species is mentioned: **bibliographic information and lists** (Liner 1992), **biogeography** (Guix et al. 2000; Heyer 1978, as *L. laurae*, 1988; Heyer and Maxson 1982; Jim 1980), **call and call parameters** (Giaretta and Kokubum 2004), **ecology, natural history, reproduction** (Cascon and Peixoto 1985 (M); Cochran 1955, *L. furnarius* equals *L. gracilis* in part; Eterovick 2003; Eterovick and Fernandes 2001, 2002; Eterovick and Sazima 2000b; Giaretta and Kokubum 2003; Haddad et al. 1988; Jim 1980; Menin and Giaretta 2003; Moreira and Barreto 1996; Prado et al. 2002; Rossa-Feres and Jim 1994; Sazima and Bokermann 1978; Strüßmann 2000), **habitat** (Brandão and Araujo 1998, 2001; Brandão et al. 1998; Canavero et al. 2001; Eterovick 2003; Eterovick and Fernandes 2001; Eterovick and Sazima 2000b; Feio and Caramaschi 1995; Haddad et al. 1988; Jim 1980; Strüßmann 2000; Zerbini and Brandão 2001), **key** (Heyer 1978, as *L. laurae*), **morphology** (Altig and Johnston 1986, Ponssa 2001), **nomenclature** (Heyer 1983), **parasite host** (Vicente et al. 1991, may be *L. gracilis* or *L. jolyi*), **relationships and systematics** (Heyer 1978, as *L. laurae*; Savage 2002 (M)), **species comparisons** (Cardoso 1985, Heyer 1983, Kwet et al. 2001 (M), Muramatsu and Cruz 1996), **species or taxonomic lists** (Duellman 2003; Frost 1985, Glaw et al. 2000), and **surveys** (Kisteumacher et al. 1984, Haddad et al. 1988).

• **NOMENCLATURAL HISTORY.** WRH met with Werner C.A. Bokermann in São Paulo at a time when each was finishing a manuscript describing new species of *Leptodactylus* (WCAB with Ivan Sazima). Both manuscripts were ready to be submitted for publication and, after discussion, little or no overlap for the new species seemed to exist. WRH and WCAB decided that the manuscripts should be submitted without each examining the other's specimens to determine if duplication had occurred. Consequently, a single new species in each publication represented the same species. Sazima and Bokermann's article was distributed on 30 November 1978 (e-mail message of 1 July 2003 from Rogerio Pessa, Instituto Internacional de Ecologia, the organization now responsible for publishing the Revista Brasileira de Biologia) and WRH's article was distributed on 29 December 1978, therefore *Leptodactylus furnarius* Sazima and Bokermann 1978 has precedence over *Leptodactylus laurae* Heyer 1978. Placing *L. laurae* in the synonymy of *L. furnarius* has been done informally in print (Cardoso 1985:89, Heyer 1983:271).

• **REMARKS.** National Museum of Natural History (USNM) numbers for *L. furnarius* specimens identified by Cochran (1955) as *L. gracilis* are USNM 81134, 96614–16, 96728–36, and 96813–14.

• **ETYMOLOGY.** The specific name is derived from the Latin *furnarius*, of ovens, in reference to the shape of the nest constructed by the males of this species.

• **COMMENTS.** The common names published for *Leptodactylus furnarius* are "Campo Grande Frog" (Frank and Ramus 1995) and "Rã" (Zerbini and Brandão 2001). The Portuguese word *rã* means frog and does not differentiate *L. furnarius* from all other frogs. Campo Grande, Paranapiacaba is the type locality of *L. furnarius*. Paranapiacaba is in the Atlantic Forest Morphoclimatic Domain (Ab'Sáber 1977). A common name based on an Atlantic Forest locality is misleading given that the most characteristic morphoclimatic domain for the species is the Cerrado Morphoclimatic Domain (Ab'Sáber 1977).

The species name is from the Latin word for oven and describes the incubating chamber of the species that is shaped like a wood-fueled clay oven. As Oven Frog is already used for the species *L. latinasus*, we propose that an appropriate English name for *L. furnarius* is the Cerrado Oven Frog.

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